RESEARCH ARTICLE

Predictors of flaxseed use among Ethiopian immigrants in the United States

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OBJECTIVE: To determine sociodemographic factors that affect the use of flaxseed among Ethiopian immigrants in the USA.

METHODS: A cross-sectional survey was carried out to determine the pattern of flaxseed use among 355 Ethiopian immigrants in the USA. Descriptive statistics were utilized to characterize the sample in relation to gender, age, education, income and length of residency in the USA Binary logistic regression analysis was used to determine which factors were associated with use of flaxseed. Multivariate logistic regression was utilized to evaluate which characteristics predicted use of flaxseed after adjusting for other variables.

RESULTS: A binary logistic regression analysis showed that gender was a significant predictor, with females having 3.4 times greater odds of using flaxseed than males ($p< 0.001$). Similar pattern was observed in a multivariate regression analysis, with females having 3.94 greater odds of using flaxseed than males ($p< 0.001$).

CONCLUSION: Gender is a significant factor for using flaxseed among Ethiopian immigrants in the USA. A multivariate regression analysis showed survey participants in the age group 41 to 50 years to be significantly more likely to use flaxseed than those who are 40 years old or younger.

Key Words: CAM; *Ethiopian immigrants in the USA; Flaxseed; Sociodemographic characteristics*

INTRODUCTION

The use of complementary and alternative medicine (CAM) has been progressively increasing. Overall, U.S. sales increased by 6.8% in 2014, totaling over $6.4 billion. (1) Prior research has indicated that individuals with several types of chronic diseases, such as diabetes, heart conditions, breathing problems, obesity, arthritis and a previous history of stroke are significantly more likely to use some form of CAM (2). A survey conducted in the USA demonstrated that in the year 1997 about 42% of the population used one or more alternative therapies (3). There is substantial evidence to indicate that the use of certain forms of CAM, such as herbs, is particularly frequent among minorities. One review has demonstrated that herbs were used by 17% of African Americans, 30% of Hispanics, and 30% of Asians (4). Flax (*Linum usitatissimum*), is one of the most popular and well researched herbs with a long history. Flax is a crop that has been in use dating back to 8000 BCE. Evidence of its use has been gleaned from fine linens made by ancient Egyptians. Flax remnants have been found in areas of Switzerland during the Stone Age (5). Flax fibers dating back to 30,000 years ago have been discovered in Eurasian Georgia (6). Modern day flax is native to the region spanning the Mediterranean up to India, and about 40% of the world's flax comes from that area. It is also cultivated in parts of the United States, Canada, and China which makes up another 40% of the world's flax production. Each structure of the plant has uses. The stem has been used in the manufacture of clothing due to its strong fibers and resiliency. Flaxseed oil, also known as linseed oil, is more prevalent within industry, and it is also used in animal feeds (7). Flaxseed sprouts are edible, with a slightly spicy flavor. In northern India, flaxseed is roasted, powdered, and eaten with boiled rice, a little water, and a little salt (8). Recent data indicate flax is among the most 5 most popular herbs in the United States with annual sales exceeding $26 million (1). Part of this popularity is due to the many documented health benefits. Flax is credited with reducing symptoms of menopause and improving postmenopausal bone health (9). Flaxseeds are a rich source of lignans, which act as phytoestrogens that exert hormonal effects. These compounds act in a fashion similar to estrogen and have effects similar to hormone replacement therapy (10). Flax has also been shown to reduce the amount of circulating cholesterol, and to reduce the growth of breast cancer tumors (11,12). Flaxseed supplementation has been demonstrated to significantly reduce systolic and disastolic blood pressure (13). Nutritional benefits of flax arise from omega-3 fatty acids, such as alpha-linolenic acid and polyunsaturated short chain fatty acids. Flaxseeds and oils contain insoluble fibers that are helpful in slowing down digestion, allowing for more nutrient absorption and better digestive tract health (14). However, it is important to note that there are potential adverse effects associated with flaxseed. It has some of the most contraindications of any herbal product. It is contraindicated in patients with digestive disorders such as acute or chronic diarrhea, esophageal stricture or inflammatory bowel disease, hypertriglyceridemia and prostate cancer (15). Gastrointestinal side-effects, such as bloating, flatulence and diarrhea have also been reported (16). Flaxseed oil is associated with increased bleeding time in patients with type 2 diabetes (17). As flaxseed is contraindicated in many conditions, and yet used in several types of chronic diseases, it is possible that individuals may not be aware of these problems. This may be true among minorities who widely use herbal products. The extent of the use of flaxseed among Ethiopian immigrants has not been reported prior to our study. This paper presents sociodemographic factors that help predict the use of flaxseed among Ethiopian immigrants in the USA.

METHODS

The study was designed to assess sociodemographic characteristics that help to predict the use of flaxseed among Ethiopian immigrants in the United States. A cross-sectional investigation was conducted using a survey that was formulated to elicit information concerning CAM practices. A pilot survey was developed to test the validity of the survey amongst a small group of randomly selected Ethiopians. The feedback was used to develop the final version of the survey. A multifaceted recruitment approach was utilized. Potential respondents were recruited using online modalities such as the People to People, Inc. website and SurveyMonkey®. Additionally, a flyer

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to promote the study was disseminated within Ethiopian communities in the Washington DC metropolitan area. The data collection was completed between April to August of 2016, and the survey was administered via online and paper modalities. The study was approved by the Institutional Review Board of Howard University. The primary dependent variable was the use of flaxseed. Independent variables that were assessed included gender, age, education, annual family income, and length of residency in the U.S. The dependent variable was self-reported use of flaxseed. Descriptive statistics including means and percentages were conducted to describe the sample. Simple logistic regression was conducted to assess the relationship between each of the independent variables and the dependent variables. Multivariate logistic regression analysis was used to evaluate which independent variables were predictive of the dependent variable after adjusting for other variables. A value of 0.05 was set for alpha a-priori. Both adjusted and unadjusted odds ratios (ORs) had 95% confidence intervals which were calculated. All analyses were done using the Statistical Package for Social Sciences (SPSS) for Windows version 23.

RESULTS

A total of 355 participants were recruited in the study. Nearly 60% of the participants were at least 41 years old. Additionally, just over 60% of the study sample was male, and approximately 40% had an annual household income of no more than $50,000. Most of the sample (62.3%) had at least a bachelor's degree. Over 81% of the sample had resided in the U.S. for at least six years. The majority had an income between 0$-$50,000. (Table 1). Approximately 37.0% of the population had a bachelor's degree or higher. Nearly 38.0% had lived in the U.S. for longer than 15 years. A total of 124 respondents in the sample self-reported use of flaxseed. Altogether, this was approximately 35% of the study population. In terms of age groups, the use of flaxseed was highest among those at least 41 years old, where more than 37% of individuals reported using flaxseed. Nearly 52% of females reported using flaxseed compared to 24% of for males. When analyzed by income, the group that used flaxseed most frequently was families with a household income of $50,001 to $100,000. In these individuals, 43% reported use of flaxseed. At a frequency rate of 35% or higher, respondents with higher levels of education tended to report greater use of flaxseed. Immigrants who had resided in the U.S. for at least 15 years used flaxseed more frequently than others.

TABLE 1

Demographic and social characteristics of Ethiopian immigrant respondents using flaxseed

Variables	Overall Sample Using CAM (n=355)	Number using flaxseed (n=124)	Prevalenceof Flaxseed use (%)
	Frequency (%)	Frequency	%
Age			
NR	3(0.8)	2	66.7
18-40	140 (39.4)	42	30
41-60	156 (43.9)	59	37.8
Above 60	56 (15.8)	21	37.5
Gender			
NR	5 (1.4)	2	40
Male	215 (60.6)	52	24.2
Female	135 (38.0)	70	51.9
AnnualFamily Income			
NR	10 (2.8)	2	20
$0 to 50,000	140 (39.4)	46	32.9
50,001-100,000	100 (28.2)	43	43
Over 100,000	105 (29.6)	33	31.4
Education level			
NR	6 (1.7)	2	33.3
<12th Grade to High school/GED	45 (12.7)	12	26.7
Some college to association	83 (23.4)	29	34.9
BA/BS or higher	221 (62.3)	81	36.7
Length of time in US			
NR	6 (1.7)	1	16.7
Less than a year to 5 years	60 (16.9)	16	26.7
6-15 years	103 (29.0)	35	34
>15 years	186 (52.2)	72	38.7

NR=Not Reported; GED=General Equivalency Diploma; BA/BS=Bachelor of Arts/Science; US=United States

TABLE 2

Binary logistic regression of predictive factors of flaxseed use among Ethiopian immigrants in the United States

Sociodemographic characteristics	OR (95%CI) for Flaxseed use	*p*
Gender		
Male	1 (referent)	
Female	3.40 (2.15-5.38)	<0.001*
Age (in years)		
18 to 40	1 (referent)	
41 to 60	1.43 (0.88-2.33)	0.145
Over 60	1.41 (0.74-2.71)	0.296
Education		
Less than 12th grade to High school diploma or GED	1 (referent)	
Some college or associate degree	1.45 (0.65-3.23)	0.362
Bachelor's or Master's Degree	1.59 (0.78-3.25)	0.203
Annual Family Income		
$0 to $50,000	1 (referent)	
$50,001 to $100,000	1.52 (0.89-2.57)	0.124
Above $100,000	0.94 (0.55-1.61)	0.813
Length of time in U.S.		
Up to 5 years	1 (referent)	
6 to 15 years	1.40 (0.69-2.82)	0.353
Over 15 years	1.74 (0.91-3.31)	0.093

*AOR=Adjusted Odds Ratio; CI=Confidence Interval; GED=General Equivalency Diploma; U.S.=United States *p<0.05 is significant.*

In the binary regression analysis, the only statistically significant predictor of flaxseed use was gender. Female participants had 3.40 times higher odds of using flaxseed compared to male participants (95% CI=2.15-5.38; p<0.001). Gender was also a statistically significant predictor of flaxseed use in multivariate regression analysis. After adjusting for all other factors, females had 3.94 times higher odds of using flaxseed in comparison to males (95% CI=2.40-6.48; p <0.001). In a binary regression analysis, individuals within the 41 to 60 year-age group were not significantly more likely to use flaxseed when compared to those age 40 or younger (Table 2). However, in a multivariate regression analysis, this age group used flaxseed at a significantly higher rate than the other age groups. Survey participants in the age 41 to 60 years group had 1.94 times higher odds of using flaxseed when compared to those who were 40 years or younger after adjusting for other variables (95% CI= 1.07-3.53; p=0.03) (Table 3).

DISCUSSION

Flaxseed (*Linum usitatissium*) is a plant that has been acclaimed for its various health benefits for centuries. Considering all the benefits flaxseed has to offer, it is no surprise that this plant is increasingly popular amongst various countries and cultures, and Ethiopia is no different. The use of CAM is influenced by a variety of factors, such as beliefs, traditions, and culture, just to name a few. The focus of this paper is on the use of flaxseed among Ethiopian immigrants in the USA and factors that predict such use. In both binary and multivariate regression analyses of our study, gender was determined to be a significant predictor. Female respondents had 3.40 times greater odds of using flaxseed than males in the binary regression analysis. They also had 3.94 times higher odds of using flaxseed in comparison to males in the multivariate regression. Various studies have reported on the use of flaxseed in different populations without a breakdown of socio-demographic

TABLE 3

Multivariate logistic regression of predictive factors of flaxseed use among Ethiopian immigrants in the United States

Sociodemographic characteristics	AOR (95% CI) for Flaxseed Use	*p*
Gender		
Male	1 (referent)	
Female	3.94 (2.40-6.48)	<0.001*
Age		
18 to 40	1 (referent)	
41 to 60	1.94 (1.07-3.53)	0.030*
Over 60	2.07 (0.95-4.51)	0.067
Education		
Less than 12th grade to High school diploma or GED	1 (referent)	
Some college or associate degree	1.44 (0.60-3.44)	0.412
Bachelors or Master's Degree	2.04 (0.84-4.91)	0.113
Annual Family Income		
$0 to $50,000	1 (referent)	
$50,001 to $100,000	1.07 (0.56-2.07)	0.831
Above $100,000	0.62 (0.30-1.28)	0.198
Length of time in U.S.		
Up to 5 years	1 (referent)	
6 to 15 years	1.81 (0.81-4.01)	0.147
Over 15 years	1.48 (0.65-3.37)	0.354

*AOR=Adjusted Odds Ratio; CI=Confidence Interval; GED=General Equivalency Diploma; U.S.=United States; *p<0.05 is significant.*

factors that preferentially influenced the use flaxseed. In a previous study, we have reported through binary and multi-variate regression analyses that females have a significant propensity to using CAM than males (18). Ipek et al. (19) investigated the use of alternative medicine in Turkey for the management of cardiovascular disease. They found that of the various herbal treatments, garlic (n=33) and flaxseed (n=13) were the most commonly used. Of the 42 (19%) patients who responded as using alternative treatments, the majority were female (p=0.04). In a similar way, a large study by Barnes et al. reported that among the nonmineral, nonvitamin products used, flaxseed oil or pills was one of the top four products utilized by both adults and children in the United States. The results of this study showed that CAM use in general was more prevalent in female patients (20). A study conducted in Jordan which explored the prevalence of CAM among patients with diabetes also demonstrated 59.1% of CAM users were female (21). Our results indicated that age was a significant determinant for flaxseed use. We found that individuals age 41 to 50 had 1.94 times higher odds of using flaxseed when compared to those who were 40 years or younger after adjusting for other variables. In both the Turkish and US studies mentioned above, it was also found that age was a significant determinant for use alternative medicine (19,20). In contrast, the Jordanian study found that, though CAM use increased with age, it was not a significant determinant (p>0.05) (21). The survey participants' level of education or was not found to be a significant predictor of flaxseed use in our study. However, individuals with higher levels of education tended to report greater use of flaxseed at 35% or higher. Similar findings were reported in the US and Jordanian studies, respectively (20,21), where education was found not to be a determinant factor. However, CAM use was more prevalent in patients with higher education. In contrast, the Turkish study determined that a higher education level was a significant factor in alternative medicine use (p=0.0001), showing that patients who obtained a higher education (bachelor's degree) had a higher incidence of CAM use (19). Our survey household income was not a statistically significant indicator of flaxseed use; however, it was found that those with a household income of $50,000 to $100,000 had more predominant flaxseed use. Similar results were seen in the US study where CAM use was more prevalent among those who were "not poor" (20). In contrast, although not significant, the Turkish study indicated that CAM use was more frequent among those who were unemployed (19-21). The length of stay did not have a significant effect on flaxseed use. However, a higher use of flaxseed among those who have lived in the US for over 15 years.

LIMITATIONS OF STUDY

This study did not assess the reasons why age and gender are predictors for flaxseed use. The reason perhaps be attributed to the traditional role women have within their families. In many countries, women are the primary decision makers when it comes to utilization of family health care. Older patients may be more open to the use of CAM due to the search for more therapeutic options to treat the health problems that tend to increase with older age.

CONCLUSION

A survey of CAM use among Ethiopian immigrants in the USA showed that females are significantly more likely to use flaxseed than males. In a multivariate regression analysis, survey participants in the age group 41-60 years use flaxseed significantly more frequently than those who are younger than 40 years. Gender and age are significant predictors of the use of flaxseed among Ethiopian immigrants in the USA.

REFERENCES

1. Izzo AA, Hoon-Kim A, Radhakrishnan R, et al. A critical approach to evaluating clinical efficacy, adverse events and drug interactions of herbal remedies. Phytother Res. 2016; 30:691-700.
2. Rahrash M, Schommer JC, Brown LM. Prevalence and predictors of herbal medicine use among adults in the United States. J Patient Exp. 2017; 4 (3):108-113.
3. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. JAMA. 1998; 280:1569–1575.
4. Gardiner P, Whelan J, White LF, et al. J Immigr Minor Health. 2013; 15(4):817-828.
5. Richard H. These vintage threads are 30,000 years old: NPR. 2009.
6. NSDU. Flax History and uses. 2012.
7. Laux, Marsha. Flax profile. 2017.
8. Chopra. Indigenous drugs of India, Academic Publishers, Calcutta, India. 1933;677.
9. Tristan DP, Williamson G. Controlled flax interventions for the improvement of menopausal symptoms and postmenopausal bone health: A systematic review. Menopause. 2013; 20 (11):1207-1215.
10. Lemay A, Dodin S, Kadri N, et al. Flaxseed dietary supplement versus hormone replacement therapy in hypercholesterolemic menopausal women. Obstet Gynecol. 2002; 100 (3):495-504.
11. Edel AL, Rodriguez-Leyva D, Thane G, et al. Dietary flaxseed independently lowers circulating cholesterol and lowers it beyond the effects of cholesterol-lowering medications alone in patients with peripheral artery disease. J Nutr. 2015; 145 (4):749–757.
12. Truan JS, Chen J-M, Thompson LU. Comparative effects of sesame seed lignan and flaxseed lignan in reducing the growth of human breast tumors (MCF-7) at high levels of circulating estrogen in athymic mice. Nutr Cancer. 2011; 64 (1):65-71,
13. Khalesi S, Irwin C, Schubert M. Flaxseed consumption may reduce blood pressure: A systematic review and meta-analysis of controlled trials. J Nutr. 145 (4):758–765,
14. Goyal A, Sharma V, Upadhyay N. et al. Flax and flaxseed oil: an ancient medicine & modern functional food. J Food Sci Technol. 2014; 51(9):1633-1653.
15. Tsai, HH, Lin HW, Pickard AS, et al. Evaluation of documented drug interactions and contraindications associated with herbs and dietary supplements: a systematic literature review. Int J Clin Pract. 2012; 66 (11):1056-1078
16. Pruthi S, Qin R, Terstreip SA, et al. A phase III, randomized, placebo-

controlled, double-blind trial of flaxseed for the treatment of hot flashes: NCCTG N08C7. Menopause. 2012: 19(1):48–53.

17. Barre DE, Griscti O, Mizier-Barre KA, et al. Flaxseed oil and lipoprotein (a) significantly increase bleeding time in type 2 diabetes patients in Cape Breton, Nova Scotia, Canada. J Oleo Sci. 2005; 54 (6):347-354
18. Fullas F, Hailemeskel B, Habte A, et al. Sociodemographic factors correlating with the use of complementary and alternative medicine among Ethiopian Immigrants. J Pharm Pharmacol Res. 2018; 2(2):24-31.
19. pek EG, Güray Y, Demirkan, B, et al. The prevalence of alternative herbal medicine and nutritional complementary product intake in patients admitted to out-patient cardiology departments. Turk Kardiyol Dern Ars. 2013; 41(3):218-224.
20. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. Natl Health Stat Report 2008; 12:1-23.
21. Wazaify, M, Afifi, FU, El-Khateeb M, et al. Complementary and alternative medicine use among Jordanian patients with diabetes. Complement Ther Clin Pract. 2011; 17:71-75.